

the passing of six resolutions, which were published in the Press at the end of August. Of these the most important are the following:—

(1) It is essential that any reorganisation of our educational system should make adequate provision for both humanistic and scientific studies.

(2) Premature specialisation on any one particular group of studies, whether humanistic or scientific, to the exclusion of all others, is a serious danger, not only to education generally, but to the studies concerned.

(3) Humanistic education implies the adequate study of language and literature, geography and history, which in each case should, at the appropriate stage of education, go beyond the pupils' own language and country.

With these resolutions the Teaching Committee of the Mathematical Association and the Committee of the Association of Public-School Science Masters expressed concurrence.

The circular drawn up by the Five Associations spoke of the possible formation of "some central council which could assume a larger responsibility and speak with a wider representative authority." No doubt the formation of such a council is eminently desirable, but it has not so far been brought into existence. The British Academy has appointed a committee which has developed into the Council for Humanistic Studies, the report of which is before us. But the Conjoint Board of Scientific Societies initiated by the Royal Society, with the president, Sir J. J. Thomson, at the head, besides the "Neglect of Science" Committee, which originated in the meeting of May 3, 1916, must not be forgotten. There is also the Education Reform Council inaugurated by the Teachers' Guild, and the report of which was reviewed in *NATURE* of September 27 last. This body has so far not been consulted by the other associations which have been conferring together.

A step in advance was undoubtedly achieved when a meeting on January 26 last was held between the Education Committee of the Board of Scientific Societies and the Council for Humanistic Studies, with Sir E. Ray Lankester in the chair. In the result it was agreed that more time must be found for the teaching of natural science, especially in the older and more famous schools, and that this time should generally be found at the expense of the classics. All agree in deprecating early specialisation, and it should be noted that this opinion applies to the classics as well as to science and modern languages.

Fortunately, while the experts are trying to make up their minds, some definite action has already been taken by the authorities. The Regulations for Secondary Schools, issued on April 19 last, require the curriculum to provide for satisfactory instruction in the following subjects: (1) English language and literature; (2) at least one other language; (3) geography; (4) history; (5) mathematics; (6) science; and (7) drawing. The report of the committee appointed by the Treasury to produce a scheme of examination for admission to the Civil Service, Class I., was issued on

June 20 last. It affords very interesting reading and proposes new regulations of a very important character. The examination is to be divided into two parts. Section A, which must be taken by all candidates, includes the following forms of test: (1) Essay; (2) English; (3) questions on contemporary subjects, social, economic, or political; (4) general principles, methods, and applications of science; (5) translation from a foreign language; (6) a *viva voce* examination. To each of these subjects from (1) to (5) one hundred marks are assigned, and to the *viva voce*, to which the committee attaches great importance, three hundred marks. This is followed by Section B, which includes a great variety of optional subjects generally marked at the same maximum, except mathematics and engineering, which receive twice the number of marks assigned to the other subjects. The report of the Civil Service Committee concludes with a number of specimen examination questions, which are intended to illustrate the views put forward by the committee.

Then there is the Education Bill now before Parliament, according to which elementary education is to be compulsory up to the age of fourteen years. It provides for the establishment of continuation schools and for compulsory attendance at the same. Another clause introduces the interesting and novel proposal to give power to local authorities to afford aid to research.

Sir Frederic Kenyon's report contains much that deserves attention, and seems to invite comment, and we cannot do better than advise our readers interested in educational questions to obtain a copy. But they should also read carefully the report of the "Neglect of Science" Committee, which brings out more clearly the claims of the advocates of natural science.

NOTES.

A VERY remarkable statement was made to the Paris Academy of Sciences on October 1 by Prof. H. Vincent, who is director of the great Army Laboratory at Val-de-Grâce, one of the most beneficent institutions of France. He was responsible, in the early months of 1915 and afterwards, for the arrangements in the French Army for the protective treatment against typhoid. He gives the results in a short note with a graphic diagram. He contrasts the terrible havoc wrought in previous wars with the almost negligible death-rate from typhoid in the present war. A heavy incidence of typhoid began in November, 1914; it became much less during March–April, 1915. During this period, November, 1914–April, 1915, the protective treatment could not be effectively carried out at the front, because of the necessities of the war. From April, 1915, onward—except for one very small rise in the summer of 1915, due mostly to paratyphoid fever—the death-rate has been kept almost at *nil*. The line runs steadily along the bottom of the diagram, as one loves to see it. From August, 1915, onward the French Army has received protective treatment, not only against typhoid fever, but also against those two forms of paratyphoid fever which at present are called paratyphoid A and paratyphoid B. The results are magnificent. As Prof. Vincent says:—"For more than two years the French Army at the front has

enjoyed a very remarkable state of sanitation; typhoid and the paratyphoid fevers no longer show themselves, save at a very low degree of frequency. And this, though all the conditions at the front are united to favour the outbreak, spread, and gravity of these diseases. Immense masses of men crowded at close quarters, in such number as one has never seen the like of in any war; incessant renewal of effectives; a long war, and almost ceaseless engagements; near contact of troops, and constant risk of infection from man to man, from patients or from germ-carriers; formidable and continuous contamination of the surface soil by the excreta of germ-carriers; breeding of flies, etc." Yet, in spite of it all, "these diseases may be considered as practically conquered." It is strange to think that one of our "anti-vivisection" societies has been trying to prevent the protection of our own men. Happily, it has failed; the latest returns show that 98 per cent. of them are protected.

In its September issue the *Little Journal*, published in Boston, U.S.A., by the firm of A. D. Little, Inc., indicates what steps have been taken during the past three years to cope with the shortage of dyes in America. Before the war there were only five concerns producing synthetic dyes in the United States. Now, in addition to the coke-oven plants and special phenol makers, there are twenty-three firms producing direct coal-tar products or "crudes," sixty-eight makers of "intermediates," and ninety-eight factories in which the finished dyes are manufactured. Approximately 75 per cent. of the dyes needed by American consumers are now being turned out in the United States, and certain of these products are made in sufficient excess to be available for export to friendly countries, and especially to England. There is still a shortage in such old-established dyes as magenta, methylene-blue, auramine, and methyl-violet. American synthetic indigo is being produced, but not in sufficient amount for the needs of the U.S. Navy. At the end of three years there are "crudes" and "intermediates" in abundance. Two large undertakings, the National Aniline and Chemical Company and the Du Pont Chemical Company, which in chemical research are the peers of the great German factories, are embarking on the manufacture of indigo and other essential dyes. The Americans claim with confidence that their dye-producing firms have the talent, the organisations, the capital, and the will. With these factors in operation the missing 25 per cent. of dyes will soon be provided, and only the odds and ends will eventually be imported.

In a lecture delivered before the London School of Economics on November 16 Mr. Sydney J. Johnstone gave an account of the localities within the British Empire where the chief key-metals, such as tungsten, molybdenum, thorium and cerium, vanadium, etc., occur. Tungsten is found chiefly in Burma and Queensland, and the Empire now furnishes about 35 per cent. of the world's production. The metal is now extracted in the United Kingdom. Molybdenum is also largely worked in this country, and adequate supplies are available from British Colonies and Dominions, especially Australia. Both these metals are of great value for special armament steels, and for the manufacture of high-speed tool steels, on which they confer the property of enabling the steel to retain its hardness when run red-hot. Thorium and ceria, the chief rare-earths in incandescent mantles, are being extracted from the monazite deposits of Travancore and Ceylon, which also contain lanthanum, erbium, didymium, yttrium, and other rare-earths. The monazite in these localities commonly contains about 10 per cent. of thorium, being twice as rich as

the similar deposits in Brazil. Occasionally much richer minerals are found in limited quantities in Ceylon—for example, thorianite, which contains as much as 60-80 per cent. of thorium, and has been the subject of much study by the Scientific and Research Department of the Imperial Institute. Mesothorium is a by-product of the working of monazite. Another by-product, zircon, might, it is suggested, be applied for the same purposes as zirconia, *i.e.* the lining of furnaces and other vessels for which a highly infusible material with a low coefficient of expansion is needed. The chief key-metal which is absent, or found only in small quantities in the Empire, is platinum, which is derived mainly from Russia and Colombia. It is possible, however, that it might be obtained in fair quantities, together with palladium, as a by-product in the treatment of nickel-copper ores in Canada.

PROF. A. RIGHI, foreign member of the Royal Society, has been elected an honorary member of the Institution of Electrical Engineers.

DR. ARTHUR KEITH, conservator of the museum of the Royal College of Surgeons, has been appointed Fullerian professor of physiology at the Royal Institution.

WE notice with regret the announcement of the death on November 28, at Zomba, Nyasaland, of black-water fever, of Mr. W. C. Mason, Imperial Entomologist, at thirty-three years of age.

PROF. T. B. WOOD, Drapers professor of agriculture in the University of Cambridge, is to be appointed a member of the Development Commission in succession to Mr. A. D. Hall, now Secretary to the Board of Agriculture.

MR. T. F. CLAXTON, director of the Royal Observatory, Hong-Kong, informs us that, in view of the world situation, it has been decided to discontinue sending the publications of the observatory to the United Kingdom, Europe, and India during the war.

THE death is announced in the *Engineer* for November 30 of Mr. James Buchanan, who was a partner in the well-known Liverpool firm of sugar machinery makers. He was associated with the executive of the Liverpool Munitions of War Committee, and undertook important Government contracts for munitions. He was a member of the Institution of Mechanical Engineers.

THE Committee on Science and the Arts of the Franklin Institute, Philadelphia, has recommended the award of the Elliott Cresson medal to Col. I. N. Lewis for his invention of the Lewis machine-gun, and proposes to recommend the award of the Howard N. Potts medal to Dr. A. E. Kennelly for his invention of the hot-wire anemometer and his application of this device to the measurement of convection from small heated wires; also that of the Howard N. Potts medal to Prof. L. Vessot King for his improved method and researches in hot-wire anemometry.

MR. J. C. MERRYWEATHER, who died on November 24, at seventy-seven years of age, was the principal member of the firm of fire-engine builders. Mr. Merryweather joined his father in the fire-engine business in 1864, and had a great deal to do with the introduction of steam fire-engines. Under his direction, his firm was the pioneer of the motor fire-engine. He was a member of the Institution of Mechanical Engineers, and received the honour of Commander of the Imperial Order of the Medjidieh in recognition of services rendered in connection with the fire protection of the Khedivial palaces.

WE referred in our issue of May 31 (p. 267) to a proposal to present the portrait of the late Prof. R. Meldola to the Royal Society and the Institute of Chemistry. The total sum received in response to this intimation, which was circulated only among Prof. Meldola's friends, was just above two hundred pounds, which has been paid to the artist, Mr. Solomon, for the portraits. Prof. E. B. Poulton informs us that the portrait presented to the Royal Society will be unveiled by Sir George Beilby on December 18, at 3 p.m.; and that presented to the Institute of Chemistry of Great Britain and Ireland, Russell Square, by the president, Sir James Dobbie, at 4.30 on the same afternoon. Prof. Poulton adds:—"I am sure that subscribers will feel a deep debt of gratitude to Col. S. J. Solomon, R.A., for the generous manner in which he has carried out their wishes, and produced a lasting memorial of a great man, and one that will co-operate with and complete the memories of his friends."

WE regret to announce the death of Mr. Charles Hawksley, on November 27, at seventy-eight years of age. An account of Mr. Hawksley's career is given in *Engineering* for November 30. He was born in Nottingham in 1839, and completed his education at University College, London, when he entered, as a pupil, the offices of his father, the late Mr. Thomas Hawksley, F.R.S. He was a partner with his father from 1866, and continued the business after his father's death in 1893. The firm was associated with water-works engineering in Great Britain, and also practised in connection with gas undertakings and sewerage works. Mr. Hawksley was president of the Institution of Civil Engineers in 1901, and at the time of his death was a member of council of the Institution of Mechanical Engineers. His death will leave a gap in these institutions not easily filled. In 1907 Mr. Hawksley founded a lectureship of the Institution of Mechanical Engineers to commemorate the centenary of the birth of his father, and by a melancholy coincidence this year's lecture was delivered last Friday evening.

By the death in action on September 28 of Major Harry Clissold, D.S.O., R.E., the world of education sustains a grievous loss. For more than twenty years Major Clissold was on the science staff of Clifton College, where he had himself been educated, and to which until the end of his life he ungrudgingly devoted his exceptional gifts. After taking a first class in the Natural Science Tripos at Cambridge, he became an assistant-master at Marlborough, but very soon returned to his old school. He at once threw himself wholeheartedly into all the interests and activities of school life, intellectual and athletic. This devotion to the interests of the school undoubtedly prevented him, as it has done so many others in similar positions, from making those contributions to scientific knowledge which were to be expected from his great ability and energy. When called upon to take command of the school contingent of the Officers Training Corps he somewhat reluctantly consented, and devoted all his spare time, including many of his holidays, to making himself as efficient as possible in his military duties. Thus, when in 1914 he was offered the command of a new field company of the South Midland Royal Engineers, he accepted it with alacrity. He went to France in April, 1915, in command of a field company, and served with such distinction that he was awarded the D.S.O. in the summer of 1916. Major Clissold's scientific knowledge and habit of mind made him a most valuable officer on the technical side, and his constant devotion to the welfare of his men caused him to be one of the most popular officers in the Army. The loss to Clifton is greater

than can be described, and to a wide circle of friends in all parts of the globe the world is a darker and a poorer place by his death.

THE supplement to the forty-sixth annual report of the Local Government Board, containing the report of the Medical Officer for 1916-17, has recently been issued. In the general summary Sir Arthur Newsholme directs attention to the need for increased effort to save child-life. In 1914 the excess of births over deaths in England and Wales was 362,354, in 1915 it was 252,201. In 1916 the rate of infant mortality was the lowest on record; there were 29,073 fewer births and 54,099 fewer deaths than in 1915, with a result that the excess of births over deaths for the year was 277,227. Sir Arthur Newsholme expresses the opinion that there should be no insuperable difficulty in reducing the total deaths in childhood to one-half their present number.

SEVERAL articles of topical interest appear in the October number of the *Scientific Monthly* (vol. v., No. 4). Dr. Burgess writes on the applications of science to warfare in France. Prof. Graham Lusk discusses food in war-time. He points out that carbohydrates are the great food-fuels of the human machine. Based on their value in calories, proprietary cereal foods are very costly, and it would be a great advance if the value in calories were placed on every food package sold. Dr. Ida Pritchett describes specific preventive and curative therapy by means of serums with special reference to gas gangrene. She believes that an antitoxic serum can be prepared for this condition, and that there is every reason to hope that serum treatment will bring about a decrease in the incidence of, and fatalities from, gas gangrene due to war wounds.

IN *Man* for November Mr. J. Reid Moir describes a piece of wood from the Cromer forest bed which is believed to show traces of human workmanship. The flat end of it appears to have been produced by sawing, and at one spot it seems that the line of cutting has been corrected, as is often necessary when beginning to cut wood with a modern saw. Other examples of pieces of wood pointed by early man are known, and it is believed that Mr. Hazzledine Warren discovered a wooden stake or spear in the ancient implementiferous deposit at Clacton-on-Sea.

MR. NEIL M. JUDD, of the United States National Museum, has just returned to Washington after completing six months of archæological work in Arizona and Utah. He has been engaged in repairing and restoring Betatakin, or Hillside House, one of the most interesting cliff houses in northern Arizona, consisting of nearly one hundred rooms, built on the sharply sloping floor of a crescent-shaped cave. The presence of hidden springs, causing damage to the structure and leading to the accumulation of silt, has been dealt with, and the restoration has been conducted in the most conservative way. The age of Betatakin cliff house is still uncertain, and no definite results can be obtained until the examination of this and other neighbouring ruins has been systematically undertaken.

THE question of the character and origin of the local gods of Egypt is still obscure; but a paper by Prof. Flinders Petrie, published in *Ancient Egypt*, part iii., 1917, does much to clear it up. Prof. Petrie has collected the original records of these cults, and by marking the headquarters of each deity he arrives at important results. Ra appears in only one southern city, and his cult seems to have come from the north-east. The distribution of Mut, the mother-goddess, is decidedly eastern, while that of Amen is

western. Set was certainly brought into Egypt by the desert road, as he had there two centres of the first class, and he was introduced by the Red Sea way to the Eastern Delta. The distribution of the Osiride triad indicates a settlement so early in the land that the worship was generally diffused. Prof. Petrie sums up his article thus: "The geography of the worship of the gods is thus seen to have a considerable value historically, as bearing on their origin and connections. When more complete research into the localities of various uncertain names may extend our identifications, it will be possible to get more light on the sources of Egyptian mythology."

ORNITHOLOGISTS will be grateful to Capt. Hugh Gladstone for his able summary of the life of John Hunt (1777-1842) which appears in *British Birds* for November. John Hunt's "British Ornithology" is a book of great rarity and some merit, but it seems never to have been completed, owing perhaps to the fact that late in life he emigrated to America. But Hunt's claim to a place of honour among British ornithologists does not rest alone on this work, the principal theme of the present communication, which is to be completed in a further instalment.

STUDENTS of bionomics will find much interesting matter in the *Scottish Naturalist* for November, wherein Dr. Eagle Clarke gives the first instalment of a study of the wild life in a West Highland deer forest. These mountainous tracts, he remarks, may be regarded as Nature reserves, retaining still much of their primitive wildness owing to the fact that it is beyond the power of man to effect any material change in the barrenness imposed by their physical conditions. The Corour Forest, which he so sympathetically interprets, is of great extent, and lies amid some of the wildest mountain country in Great Britain. In his survey he divides the forest into three zones—the alpine, the sub-alpine, and the valley zone—giving an analysis of the fauna, resident and migratory, of each. Incidentally, of necessity, he describes the flora also, but only in its relation to animal life. In the same number the Misses Rintoul and Baxter record some extremely interesting observations on the autumn displays of some of our native birds. Records of isolated cases by E. Selous, J. E. Millais, and H. Eliot Howard can now be compared with the much more extensive collection here brought together, but their precise significance seems as elusive as ever.

THE *Journal of Agricultural Research* (vol. x., No. 4) contains a further important contribution by E. B. Hart, E. V. McCollum, and other colleagues to the question of the physiological effect on growth and reproduction of rations balanced from restricted sources. Previous work has indicated that a ration can be complete and efficient only when it contains protein of adequate quantity and quality, adequate energy, mineral ingredients in proper quantity and proportion, and two factors (vitamines) of unknown constitution which have been temporarily designated as "fat-soluble A" and "water-soluble B." Later work now indicates that to these must be added the important factor of direct toxicity. This can be wholly absent or so mild in its effects as to be entirely obscured when the other essentials of a ration are at an optimum adjustment; or with fair adjustment it may only reveal its effects when the ration is continued over a very long time and the animal involved in the extra strains of reproduction and milk secretion. Rations composed exclusively of wheat products (grain and straw) did not sustain growth with Holstein heifers. Such animals also failed to show œstrus and could not be bred. Marked pathological conditions resulted, such as

blindness, feeble and emaciated condition, and abnormal excitability followed by collapse. The responsibility was found to be due in part to the inadequate salt mixture provided by the ration, and in part to inherent toxicity in the grain. By the use of maize stover or alfalfa hay as roughage in place of the wheat straw growth was sustained, but reproduction was only partially successful, weakness commonly appearing in the second gestation. Maize grain plus wheat straw allowed sustained growth, but at a slow rate. Additions of salts to this ration made it normal. Addition of wheat embryo to a maize ration caused disturbances, bringing about early abortions, thus indicating a high content of the toxic material in the wheat kernel.

THE report of the Government Cinchona Plantations and Factory in Bengal for the year 1916-17, being the fifty-fifth annual report, is, as usual, a very interesting and instructive document and a remarkable record of efficiency. From it we learn that the acreage under Cinchona has been increased to 2405½ acres, as against the 2295 acres under cultivation the previous year. Figures are given showing the profits of the undertaking during the period 1900-17. For an outlay of 44,84,100 rupees the Government has received 51,24,900 rupees, and has acquired entirely within the period 1905-17 additions to factory buildings, etc., which have quintupled the 1900 output, a large reserve of quinine, 2738 acres afforested with timber and fuel trees, the 2405½ acres of Cinchona, and a large output of other manufactured products, making a total return in cash and readily realisable assets of 1,17,66,634 rupees. Among other medicinal plants grown are *Digitalis*, *Chenopodium ambrosioides*, and *Ipecacuanha*.

WE welcome the first number of a new journal, *Psychobiology*, to be published bi-monthly by the Williams and Wilkins Co., Baltimore, U.S.A. (London agents, Cambridge University Press; price per volume, 23s. net), devoted to the field common to psychology and the biological sciences. It will concentrate attention on the interconnection of mental and physiological functions, holding firm to the conception of the organism as a unity. It is edited by Prof. Knight Dunlap, in association with Profs. J. J. Abel, W. B. Cannon, R. Dodge, S. I. Franz, H. S. Jennings, and G. H. Parker—a strong editorial board. In the first number S. I. Franz and K. S. Lashley show that in the white rat removal of large parts of the frontal portions of the brain does not greatly interfere with a learned reaction; D. I. Macht and S. Isaacs discuss the influence of some opium alkaloids on the psychological reaction time; R. Ogden and S. I. Franz deal with recovery from experimentally produced hemiplegia; Prof. J. B. Watson relates experiments which show that the delaying of the nutritive reward for thirty seconds after rats solved a problem box did not alter the learning process; and the editor suggests the theory that the effect of pleasure in "fixing" a reaction may be due to the liberation of a specific hormone, which need not necessarily come from a gland. The whole number is interesting, and we wish the new venture success.

THE outlook of chemistry in the United States, with special reference to the resources of this science in war and peace, is discussed by Prof. Julius Stieglitz in his presidential address to the American Chemical Society, published in *Science* for October 5. Prof. Stieglitz urges for the United States what has been advocated for this country—a declaration of chemical independence. From a chemist's point of view the first consideration necessary for this purpose is that the manufacturer should reckon the chemist "worthy of his hire." The tendency hitherto has been to treat the

chemist merely as an employee instead of co-operating with him as a partner, and this almost invariably dampens his enthusiasm. Secondly, the adoption by the legislatures of a definite national policy as regards the establishment of independence in chemical supplies is advocated. This has already been inaugurated in the question of the fixation of atmospheric nitrogen. Thirdly, wise patent legislation is necessary. Applied chemistry is not wholly industrial: chemistry promises to be the guide, not only of physiologists, but also of bacteriologists, pathologists, and laboratory clinicians. Accordingly, it is essential that the chemistry departments of universities and colleges should keep up their output of men, and maintain a high standard of scientific quality. The great impetus which science has received from the war involves certain dangers. The chief of these is that superior research opportunities and financial returns will attract all the best men away from academic life. In the national interest professorial chairs must be occupied by the best men, and to ensure this salaries must be raised. The continued need for pure research untroubled by any possible industrial application of its results must not be forgotten. For chemistry in America a brilliant future is predicted provided that the chemist is given a "square deal," and that this science in the universities is placed on the plane occupied by law and medicine.

In the week following November 20, the anniversary of the Cripple Gate Fire, the British Fire Prevention Committee completed its first twenty years' work, which has been carried on entirely by voluntary effort. Among the activities of the committee may be mentioned the promotion of technical research, the initiation of legislation, by-laws, and regulations, the compilation of evidence on the subject of fires, and the preparation of literature and circulars of a precautionary character, more than 250 publications of this nature having been issued. The committee's recommendations have been endorsed by competent authorities in the United States, France, and Russia. Instances of co-operation with other countries are afforded by the organisation of the International Fire Prevention Congress, which was attended by 800 visitors, representing fifteen Governments and 200 municipalities and corporations from all parts of the world, and the International Fire Exhibition, at which a collection of historical and industrial exhibits was shown, and the lessons of many of the great conflagrations of the past decade were discussed. Apart entirely from the propaganda work in fire prevention and the extensive system of publishing trustworthy data, the committee established twenty years ago a complete testing station near Regent's Park for full-sized fire tests, without any encouragement or assistance from the Government whatever. With the advent of the war, which has severely affected professional men, it is unlikely that work of this kind can continue to be dependent solely on the voluntary effort and contributions of the technical professions concerned, and being of great national importance, the committee should be afforded the co-operation and assistance of those public departments which are now concerned in research work and have Treasury or special research funds available for it.

Engineering for November 30 contains an illustrated description of the standard propelling machinery for British standard ships. The main engines are triple-expansion, having cylinders 27 in., 44 in., and 73 in. diameter by 48-in. stroke. There are three boilers of the multitubular return-tube type, 15 ft. 6 in. diameter by 11 ft. 6 in. long, for 180 lb. per sq. in. working pressure, and working under Howden's system of forced draught. The outstanding features of the engine design indicate that it is of Clyde origin. All

the designs, excepting the auxiliary machinery, were prepared by one firm, which had extensive experience in machinery for this size of cargo vessel, and were issued complete to various contractors. The advantages of manufacture to one common design were found of convenience in many ways. For example, one firm discovered defects in a soleplate casting; this was at once replaced by a similar casting from another firm, which did not require it immediately, thus preventing several weeks' delay. Orders for the auxiliary machinery, and for all small items, such as valves, branch pieces, etc., were placed with firms which specialise in such work, and furnished all these details ready to fit in place. The positions of the auxiliary machinery were so selected that all erection could be completed before the launch, thus simplifying greatly the amount of pipe-fitting which usually has to be done.

AMONG the forthcoming books of science we notice the following:—"The Education of Engineers," H. G. Taylor (*G. Bell and Sons, Ltd.*); "What Industry owes to Chemical Science," R. B. Pilcher and F. Butler-Jones, with an introduction by Sir G. Beilby (*Constable and Co., Ltd.*); "Synthetic Products," A. R. J. Ramsey and H. C. Weston (*G. Routledge and Sons, Ltd.*); "Elements of Graphic Statics," "Moving Loads by Influence Lines and other Methods," "Strength of Structural Elements," each by E. H. Sprague; "Estimating Steel Work for Buildings," B. P. F. Gleed and S. Bylander; "Machine Shop Practice," G. W. Burley; and "The Theory of the Centrifugal and Turbo Pump," J. W. Cameron (*Scott, Greenwood, and Co.*). Messrs. Longmans and Co. have in preparation for appearance in their series of "Monographs on Biochemistry":—"The Development and Present Position of Biological Chemistry," Dr. F. Gowland Hopkins; "The Polysaccharides," A. R. Ling; "Colloids," W. B. Hardy; "Physical Methods used in Biological Chemistry," Dr. S. G. Walpole; "Protamines and Histones," Dr. A. Kossel; "Lecithin and Allied Substances," Dr. H. Maclean; "The Ornamental Plant Pigments," A. G. Perkin; and "Chlorophyll and Hæmoglobin," H. J. Page.

OUR ASTRONOMICAL COLUMN.

ERRATIC CHANGES IN CLOCK RATES.—An interesting suggestion as to the cause of the sudden variations which are sometimes observed in the rate of the three standard clocks of the U.S. Naval Observatory has been made by Mr. W. A. Conrad (*Popular Astronomy*, vol. xxv., p. 522). It has long been noticed that the rates are subject to sudden fluctuations, and that the three clocks usually vary in the same direction at the same time, and by almost equal amounts. As the temperature and pressure controls appear to be beyond suspicion, such changes have hitherto been attributed to imperfect determination of instrumental constants. In seeking the cause of a very bad jump in the rates of the three clocks in February, 1917, it was found that many jumps were coincident with "cold waves," and that on this occasion there was a very marked low-pressure area receding to the east and an abnormally high barometer to the west. It is suggested that the observations of the clock stars may have been affected by lateral refraction, and that a study of the weather map might possibly help to explain the anomalous results which have occasionally been obtained in determinations of the positions of stars.

THE HECTOR OBSERVATORY, NEW ZEALAND.—The report of the Government Astronomer for the past year includes an account of the excellent system of time-signals which has been organised by Mr. Adams, and a plea for the establishment of a wireless time-service. In co-operation with Mr. H. F. Johnston, of the Mag-